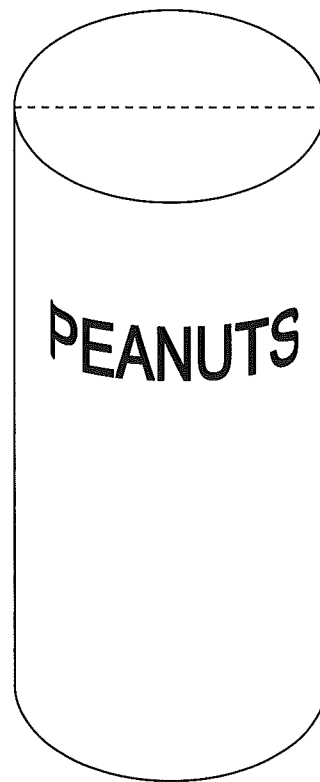
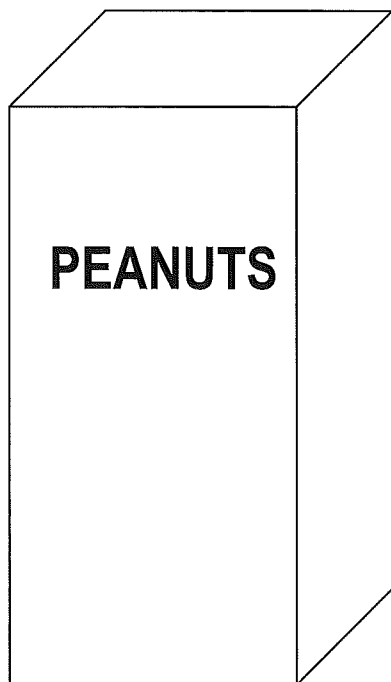


Nutty Calculations

Snacks are sold in small containers at the convenience store. Peanuts come in 2 containers, a cylinder and a rectangular prism. Determine which container has the greatest capacity in cubic inches. Round your answers to the nearest hundredth.



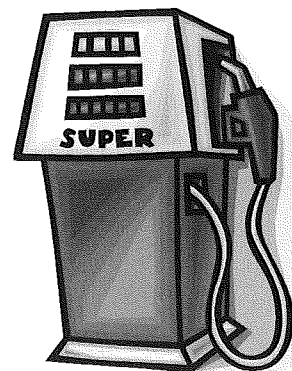


Unit 9 Lesson 1

The Filling Station Part 1

Rectangular Prism, Triangular Prism, and Rectangular Pyramid

- 1 How do the heights of the 3 solids compare?
- 2 How do the bases of the 3 solids compare?
- 3 How many triangular prisms do you predict it would take to fill the rectangular prism? Explain your reasoning.
- 4 Conduct the experiment to verify your prediction. How many triangular prisms does it take to fill the rectangular prism?
- 5 How many rectangular pyramids do you predict it would take to fill the rectangular prism? Explain your reasoning.
- 6 Conduct the experiment to verify your prediction. How many rectangular pyramids does it take to fill the rectangular prism?



Cylinder, Cone, Sphere

- 7 How do the diameters of the 3 solids compare?
- 8 How do the heights of the cylinder and cone compare to the diameter of the sphere?
- 9 How many cones do you predict it would take to fill the cylinder? Explain your reasoning.
- 10 Conduct the experiment to verify your prediction. How many cones does it take to fill the cylinder?
- 11 How many cones do you predict it would take to fill the sphere? Explain your reasoning.
- 12 Conduct the experiment to verify your prediction. How many cones does it take to fill the sphere?



The Filling Station Part 2

Using the results from **Nutty Calculations**:

- Record the volume of the rectangular prism in the table.
- Calculate the volumes of the triangular prism and the rectangular prism using the results from the class discussion and the experiment. Round answers to the nearest hundredth.

	Volume (in. ³)	Ratio (in simplest form)	
Rectangular Prism		$\frac{\text{Volume}_{\text{rectangular prism}}}{\text{Volume}_{\text{rectangular prism}}}$	
Triangular Prism		$\frac{\text{Volume}_{\text{triangular prism}}}{\text{Volume}_{\text{rectangular prism}}}$	
Rectangular Pyramid		$\frac{\text{Volume}_{\text{rectangular pyramid}}}{\text{Volume}_{\text{rectangular prism}}}$	

Using the results from **Nutty Calculations**:

- Record the volume of the cylinder in the table.
- Calculate the volumes of the sphere and the cone using the results from the class discussion and the experiment. Round answers to the nearest hundredth.

	Volume (in. ³)	Ratio (in simplest form)	
Cylinder		$\frac{\text{Volume}_{\text{cylinder}}}{\text{Volume}_{\text{cylinder}}}$	
Sphere		$\frac{\text{Volume}_{\text{sphere}}}{\text{Volume}_{\text{cylinder}}}$	
Cone		$\frac{\text{Volume}_{\text{cone}}}{\text{Volume}_{\text{cylinder}}}$	



The Filling Station Part 3

Use your observations and/or the ratios from your tables to answer the following questions.

- 1 A rectangular pyramid and a rectangular prism have the same length, width, and height. If the volume of the rectangular pyramid is 85 cubic centimeters, what is the volume of the rectangular prism?

- 2 A triangular prism and a rectangular prism have the same length, width, and height. If the volume of the triangular prism is 36 cubic inches, what is the volume of the rectangular prism?

- 3 A cone and a cylinder have the same diameter and height. If the volume of the cone is 52 cubic centimeters, what is the volume of the cylinder?

- 4 A sphere has the same diameter as a cylinder. The diameter of the sphere is also congruent to the height of the cylinder. If the volume of the cylinder is 24 cubic inches, what is the volume of the sphere?

- 5 A sphere has the same diameter as a cone. The diameter of the sphere is also congruent to the height of the cone. If the cone has a volume of 18 cubic centimeters, what is the volume of the sphere?



Independent Practice

Prisms and Cylinders

$$V = Bh$$

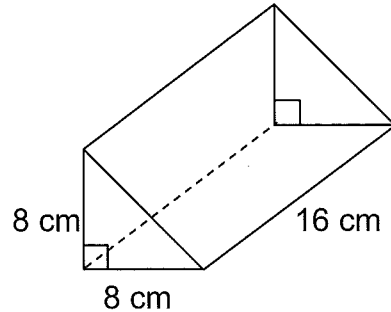
The volume of a prism or cylinder can be found by multiplying the area of its base (B) by its height (h).

$$V = Bh$$

$$V = \left(\frac{1}{2} \cdot 8 \cdot 8\right) \cdot 16$$

$$V = 32 \cdot 16$$

$$V = 512 \text{ cm}^3$$



$$V = Bh$$

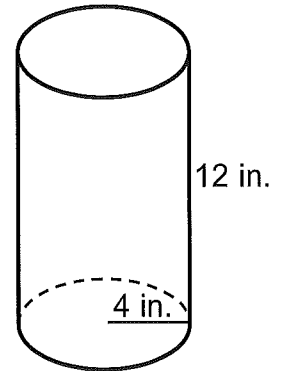
$$V = (\pi r^2)h$$

$$V = (\pi \cdot 4^2) \cdot 12$$

$$V = 16\pi \cdot 12$$

$$V = 192\pi \text{ in.}^3$$

$$V \approx 602.88 \text{ in.}^3$$

**Pyramids and Cones**

$$V = \frac{1}{3}Bh$$

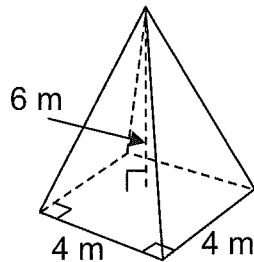
The volume of a pyramid or cone can be found by multiplying $\frac{1}{3}$ the area of its base (B) by its height (h).

$$V = \frac{1}{3}Bh$$

$$V = \frac{1}{3}(4 \cdot 4) \cdot 6$$

$$V = \frac{1}{3}(16) \cdot 6$$

$$V = 32 \text{ m}^3$$

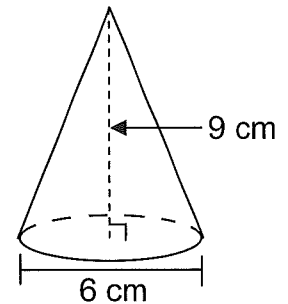


$$V = \frac{1}{3}Bh$$

$$V = \frac{1}{3}(\pi r^2) \cdot h$$

$$V = \frac{1}{3}(\pi \cdot 3^2) \cdot 9$$

$$V = 27\pi \approx 84.78 \text{ cm}^3$$

**Spheres**

$$V = \frac{4}{3}\pi r^3$$

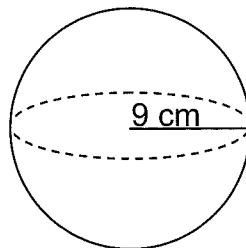
The volume of a sphere can be found by multiplying $\frac{4}{3}\pi$ by the cube of its radius.

$$V = \frac{4}{3}\pi r^3$$

$$V = \frac{4}{3}\pi \cdot 9^3$$

$$V = 972\pi$$

$$V \approx 3,052.08 \text{ cm}^3$$

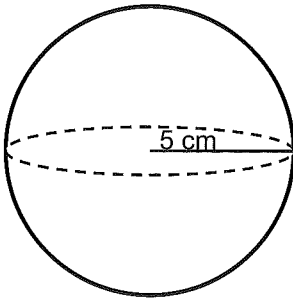




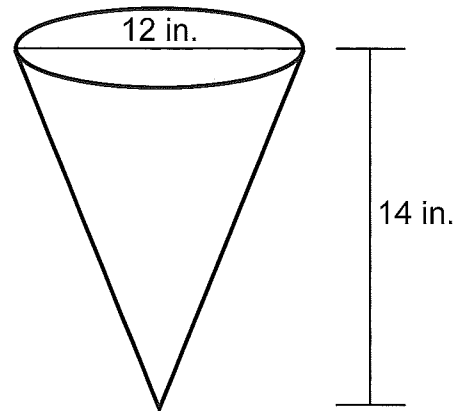
Unit 9 Lesson 1

Find the volume of each solid. Round your answers to the nearest hundredth.

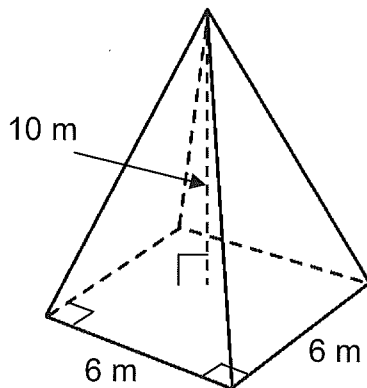
1



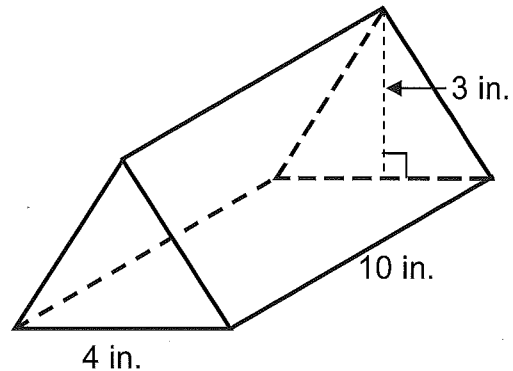
2



3



4



5 The volume of a cylinder is 128π cubic inches. If the height of the cylinder is 2 inches, what is its diameter?

6 The base of a square pyramid has an area of 16 square centimeters. If the volume of the pyramid is 32 cubic centimeters, what is the height of the pyramid?

Puzzling Prism

A right triangular prism and a square pyramid have the same length, width, and height. If the pyramid has a volume of 12 cubic centimeters, what is the volume of the triangular prism? Justify your answer.

FOR TEACHER USE ONLY:

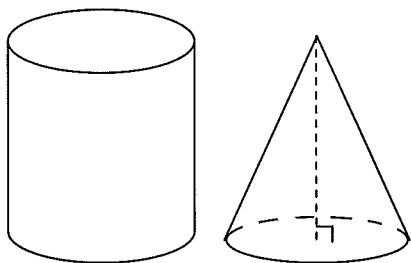
a. YES NO Student arrives at a correct solution?

	4	3	2	1
b. Conceptual Knowledge				
c. Procedural Knowledge				
d. Communication				



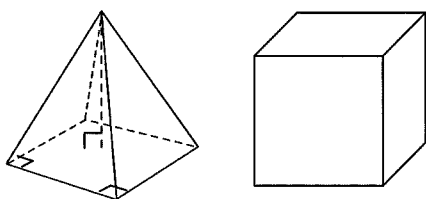
Unit 9 Lesson 1

- 1 A cylinder has a volume of 216 cubic centimeters. Find the volume of a cone with the same height and diameter as the cylinder.



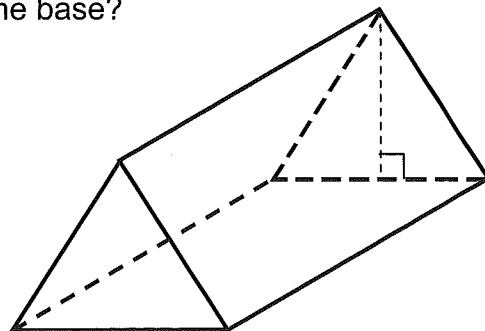
- A 72 cm^3
- B 108 cm^3
- C 216 cm^3
- D 648 cm^3

- 2 A square pyramid has a volume of 48 cubic meters. Find the volume of a cube with the same length, width, and height as the pyramid.



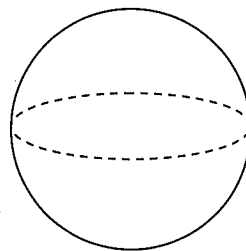
- A 72 m^3
- B 96 m^3
- C 144 m^3
- D 192 m^3

- 3 A triangular prism has a volume of 54 cubic inches. If the height of the prism is 6 inches, what is the area of the base?



- A 9 in.^2
- B 18 in.^2
- C 27 in.^2
- D 108 in.^2

- 4 A sphere has a diameter of 12 meters. Find the volume of the sphere.



- A $48\pi \text{ m}^3$
- B $288\pi \text{ m}^3$
- C $864\pi \text{ m}^3$
- D $2,304\pi \text{ m}^3$